An evolution of experts: MEDLINE in the library school

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Question: What is the real value that medical librarians bring to the health care environment? How have library science educators, frequently former practitioners themselves, responded to the challenge of expert searching?

Methods: In this paper, I give an historical introduction to the landscape of medical information retrieval through the development of MEDLINE. I then look at the evolution of training in online searching and its place in the context of library school education and particularly the effect of generalist education on future specialists. Finally, I acknowledge the new role of the informationist as another assertion of our professional expertise.

Conclusions: The three interdependent subsystems of our professional machine—our schools, our association, and our professional peers—must all respond to this challenge by asserting our expertise in our curricula, in our continuing education, and in our dialogues with each other. Only by acknowledging the interaction of these subsystems will real and positive changes be effected to benefit our profession and our constituencies.

INTRODUCTION

The professional firestorm of retrospection following the tragic death of a study participant at Johns Hopkins [1] has served as a defining moment for the medical library profession. Medical librarians faced with a death are collectively asking themselves what role they, as information professionals, could have played in averting the tragedy. This question raises a larger one: What is the real value that medical librarians bring to the health care environment? Expert searching is the answer. ''It remains the province of highly trained and experienced librarians,'' because, crucially, ''health care professionals and biomedical research personnel generally do not have [the] set of skills and knowledge'' [2].

The professional school, the professional group, and the professional association are highly interdependent components of the system called health sciences librarianship [3]. Educators in library and information schools, frequently former librarians themselves, are aware that the Task Force on Expert Searching has placed an awesome responsibility on us: those ''highly trained'' librarians mentioned by the task force may be receiving their initial training in medical information retrieval from us. This paper is about the history of this responsibility.

MEDLARS AND MEDLARS TRAINING

The sheer magnitude of medical literature is becoming impossible to deal with by conventional means . . . this in itself is a pathetic state of affairs, but when one adds to it the growing duplication of effort in medical research, which is a scarce enough national resource, the situation becomes alarming. [4]

Or, as Vannevar Bush put it: ''Science may become bogged down in its own products, inhibited like a colony of bacteria by its own exudations'' [5]. Commentators today tend toward nautical, or at least watery, metaphors to express our common feeling of being overloaded with information: we surf, we navigate, we are adrift in a sea. Staff at the National Library of Medicine (NLM) in the 1950s tended to speak less like sea captains and more like librarians. The power of the computer was necessary to bring ''bibliographic relief to the harried medical community'' [6], lest the community be ''smothered under the weight of countless tons of valuable, but largely ignored, literature'' [4].

To this deluge, or weight, the Medical Literature Analysis and Retrieval System (MEDLARS) system was a godsend. MEDLARS began life in 1957 as the Index Mechanization Project, an attempt to automate composition of NLM's *Current List of Medical Literature.*

The MEDLARS system became fully operational in January of 1964.

The 1960s saw another landmark in the development of the medical library profession, one to which all subsequent achievements must ultimately be attributed: the passing, in 1965, of the Medical Library Assistance Act (PL 89–291) [7, 8]. One very immediate practical effect of the act was the establishment in 1970 of a regional network and regional libraries of medicine. The first regional MEDLARS center was opened at the University of Colorado in 1965; three more—at the Universities of Alabama and Michigan and Harvard University—joined it in 1966 [9]. By 1970, the system had reached an annual rate of 24,000 searches and had grown to encompass 10 computers in the United States and 11 around the world [10]. All that was required was to teach enough people to use it.

THE MEDICAL LIBRARIAN AND THE LIBRARY SCHOOL

The education of specialists is a longstanding problem for schools and employers alike. NLM's predecessor, the Library of the Surgeon General's Office (SGO), perceived this as an issue as early as 1920. No medical library specialization existed; so the SGO librarian, Brigadier Robert Ernest Noble, suggested that the Medical Department compensate by starting its own library school, "a part of the educational system of the Army" [9]. In fact, education in medical librarianship happened primarily on the job [11]. But, in 1937, the first hospital librarianship course offered "anywhere in the world" was taught at the University of Minnesota library school. The instructor, Thomas Fleming, went to Columbia University in 1939 to teach the same course in a longer format: "Bibliographic and Reference Services in the Medical Sciences" [12]. Estelle Brodman then expanded on Fleming's course in 1948 "to cover all phases of medical library work" [11].

By the end of World War II, medical library internships at Tulane (1941) and Vanderbilt (1944) had been established to give practical experience to students. In 1949 and 1950, the Veterans Administration (VA) sponsored several intensive and short-term courses taught by physicians in four library schools, but these were primarily in-house affairs attended by VA librarians [12]. So, in 1967, when MEDLARS was three years old, Alan Rees could write that an authentic medical librarianship curriculum did not exist. He reported that only sixteen library and information science schools, just over one-third of the forty-six American Library Association (ALA)–accredited schools that year, offered any medical library–related courses, a total of nineteen unique courses across sixteen institutions. Seventeen of those nineteen courses were general introductions or centered on bibliographies. Only one—Rees's own Case Western Reserve University—addressed the problem of information retrieval, teaching MEDLARS use through "Medical Subject Analysis and Searching" [13, 14].

By 1973, it was clear that two principal types of formal education in medical librarianship took place: education through library schools and education through internships, "alternative avenues of entrée . . . equal but different" [15]. Fred W. Roper ascribed the founding of all the degree programs to the Medical Library Assistance Act of 1965; those programs provided almost 70% of all the people getting trained at all. However, because these programs were relatively new, much variation could be found among practitioners. Some librarians had no formal preparation; some had taken a medical bibliography course or medical librarianship course; while some could now be described as having had a sequence of specializing courses, such as at Case or Columbia.

IMPACT OF MEDLARS

Forecasts about the skill sets, job descriptions, and demographics of medical librarians living in a MEDLARS future had begun to appear concurrent with the technology in the mid-1960s. The number of medical librarians required to handle it was expected to increase many times, but these librarians would do different things than their predecessors: "the more difficult problems of abstracting and classification, rather than the routine filing and retrieval operations" [4]. Brodman envisioned medical librarians who could "design and manipulate new systems of presenting the available information," as well as understand the new kinds of indexes and "the new techniques to find their ways about them." In fact, Brodman concluded, the medical librarian of the future "would have to know more about machines than is common these days," something she saw as unfortunate, because it would discourage "the average woman" with her sex-linked inability to handle machinery [sic] [16]. According to medical educator Charles Strother, the significant changes occurring in medicine, combined with the impact of computerized information systems, would demand that medical librarians know more about more disciplines and different disciplines than before, as well as systems analysis and systems design [17].

TRAINING FOR INFORMATION RETRIEVAL

The history of education and training in any information technology runs, of course, in parallel to the history of the technology, allowing for a small time lag between the time the technology is perceived to be operational and the time that programs training future users perceive it to be stable enough to teach. In the case of MEDLARS, no training took place without operation: at its beginnings in 1964, the system's usage was restricted to NLM staff or to centers in contractual relationships with NLM staff, and only small numbers of people actually had to know how to use it. Davis McCarn and Joseph Leiter described the process nicely:

To obtain a search, a qualified health professional submits a

written request describing the details of the information he needs. This request is then ''formulated'' by a trained analyst, coded into the vocabulary of MEDLARS for input to one of the computers, and processed on the computer. The output is reviewed by the same search analyst who had formulated the query, and finally, in 3 to 4 weeks, the requester receives his bibliography. [10]

These requests came in ''via letters, telegrams, phone calls, or person-to-person contact'' and were then routed to the analysts. Who were these analysts? They were ''selected from among the ranks of indexing staff'' with training designed to prepare them for ''the formidable task of mediating between the sophisticated inquirer and the idiot computer'' [6]. However, for the first few years, the search services had to be extremely limited, because ''only a few operators were familiar enough with the system to process searches, give demonstrations, and train associates'' [9]. Even three years after Seymour Taine's report on MEDLARS, Brodman could write that MEDLARS affected few practicing librarians, because MEDLARS use was such a rarefied art and searches themselves ''too few in number to be the normal experience of most librarians'' [16].

The training required of those few who did use MEDLARS was intensive and extensive. From 1964 to 1971, NLM required users to take a three-week-long course in Bethesda, tellingly described from the first as ''for librarians.'' These courses were eventually distributed to the regional medical libraries and offered regularly at no cost to the employer. One-third of the total course time was spent on online searching. Wyndham Miles made an important distinction between process competence and subject competence, both of which were required:

The person sitting at the terminal and desiring citations from MEDLINE needed to know the procedure, which could be learned in a short time, and the strategy of locating citations indexed under the library's medical subject headings list, which required for proficiency many hours of training and experience. [9]

At the very historical moment that medical librarianship was beginning to emerge as a distinct specialty, the new and equally revolutionary information retrieval system MEDLARS had become MEDLINE and needed to be taught to future users. Scott Adams, in his 1964 essay on the system, saw clearly that such effort was inevitable ''to train manpower so that decentralized search centers,'' such as the regional libraries of the future, could be staffed. Because these distributed MEDLARS searchers had to be trained somewhere, it would necessarily have ''a continuing impact on education and training for medical librarianship'' [5]. However, even Adams—in a magnetic-tape, batch-processing era—could not have foreseen the expansion of MEDLARS searching to libraries outside NLM and the corollary need for trained staff employed outside NLM.

At what point did medical librarian education and information-retrieval education converge? For it was by no means a foregone conclusion when MEDLARS began life that medical librarianship and information retrieval in medicine were necessarily synonymous activities. An important international conference devoted to health sciences library education was held in 1967 at the University of Washington's School of Library Science in Seattle. Notable speakers from library science and health care alike—including Brodman and Rees—deliberated on the topic: what was required of the medical librarian of tomorrow? The agreed-upon principles of education were:
1. basic principles and techniques of librarianship
2. structure, organization, and management of medical library resources, facilities, and technology
3. subject content of biomedicine
4. environmental settings of medical practice, education, and research [18]

Training in information retrieval appeared nowhere on the final curricular agenda. Indeed, Brodman admitted that computers were here to stay: ''We must prepare our students to handle the problems of such devices, which they will encounter more and more as time goes on,'' and she explicitly stated that ''we will teach them this in library schools and elsewhere'' [16]. But searching expertise was not listed by panelists as an item ''for further consideration,'' even in a list of emerging responsibilities [18]. How, then, did libraries handle the problem of MEDLINE?

MEDLINE IN THE LIBRARY SCHOOL

The first use of MEDLINE in library school classrooms was as a demonstration of bibliographic databases in action, as opposed to specifically for ''training MEDLINE analysts'' [13, 19]. The first report of a library school using an NLM bibliographic product as a conscious part of preprofessional education of medical librarians was published by Winifred Sewell in the *Journal of Education for Librarianship* in 1974. Sewell, a graduate of the Columbia master's degree program and one of the early developers of Medical Subject Headings (MeSH), began teaching MEDLINE as part of reference work in her biomedical literature course at the University of Maryland's library school in 1971. Five three-hour sessions were devoted to medical reference and six hours to MEDLARS and MEDLINE [20].

The following year, Rees, Lydia Holian, and Ann Schaap of Case presented results of ''an experiment in teaching MEDLINE'' as part of Case's specialized training program in health sciences librarianship. Begun in 1967, this pioneer program, by 1974, had produced 131 graduates, 68% working in health sciences libraries [14]. Rees was himself a graduate of NLM's MEDLINE training course. The experience prompted him to write a critique arguing that MEDLINE required embedding in a ''broader conceptual context,'' such as that offered in a library school setting, to accomplish the grounding of MEDLINE in ''real information needs of personnel in the health services.'' The ingredients Rees considered necessary for this experiment to work included a library school with a ''dem-

onstrated commitment'' to medical librarianship as a profession *and* close ties to a university medical center with its adjacent libraries and, thus, adjacent practitioners.

Establishing MEDLINE as part of a curriculum was important. Removing it from the curriculum defined competence in searching as ''noncore,'' always to be acquired post-curriculum, post-degree, and on the job. Rees saw an emerging dilemma for the profession, because MEDLINE training was ''increasingly required in view of the advancing state of information technology and the job market'' [14]. By making MEDLINE use part of preprofessional training, Rees believed both student and employer would be more realistically served.

Taking Rees up on his critique and challenge, NLM supported his project technically and financially, so that Rees could rent four computer terminals. The eight-week course was comprised of thirty-two hours of lectures—sixteen devoted to MeSH categories—and eighteen hours of lab work. The students in this pilot program were eighteen US and eight international students, as well as three staff members at the Cleveland Clinic's health sciences library. Designed from the first to locate MEDLINE instruction within the real world of librarianship, the outcomes of the course, as measured by exams and student comment, supported the importance of a real-world connection. Rees wrote:

The best performance was achieved by those who had used MEDLINE in connection with their work-study assignments involving real usage. The reference staff members also achieved high scores, possibly due to their familiarity with MeSH and its usage. [14]

In fact, six of those eight international students taking this pilot course were already practicing librarians; of the US students, besides the three practitioners at Cleveland Clinic, several others were paraprofessionals in the same facility. Rees and colleagues were technologically challenged in implementing this MEDLINE course—''Murphy's law prevailed at all times''—but the most serious obstacle was presented by the cost of the technology. Not only was the leased computer time highly expensive—online access time was estimated at $6,000 per student for 400 hours, comprising half of the total expenditures per student for the entire course!—but much more instructor time, and thus instructor cost, was involved than in the typical library school class. Without NLM funding, the experiment could not have taken place.

Rees's expensive and difficult pilot project, intended to ''embed'' medical literature searching in the context of preprofessional training, had left him with two conclusions. First, that ''It is patently obvious that MEDLINE training cannot be provided by part-time amateurs. No library school in the United States has the requisite competence for providing such training'' [14]. But, even given this strong statement, Rees still saw the best search training as a hybrid experience exploiting both content and process skills: a combination of library schools' educational expertise, providing ''MEDLINE in its professional context,'' and MEDLINE analysts' own operational expertise. Rees's statement also raised an open question for the profession. If library schools should be able to generate the requisite competence, could such training in fact be provided by those schools, instead of NLM?

Library schools appeared to be trying. In 1973, although only three of the eight directors of medical library degree–training programs in ALA-accredited schools cited information retrieval techniques as learning objectives, ''these elements are present to some extent in all of the programs'' [15]. Six schools reported that they offered at least two courses in biomedical or science librarianship *and* information storage and retrieval—the curricular context sought by Rees—and one school offered as many as five.

Robert Berk and Rebecca Davidson [21] found that, typically, MEDLINE experience in library and information science (LIS) programs was nested in a general course on health sciences librarianship. The average time spent on MEDLINE per course was 13.5 hours; the typical course was offered once a year to a class of between 15 and 30 students.

In the early 1970s, a move toward medical information–retrieval education and medical specialist education made sense. The information ''explosion,'' the sheer quantity and fragmentation of scientific literature being published, now seemed to require specialists to harness it, and specialists were made in library schools:

The mere quantity of information in any one subject now makes necessary more than a general knowledge of reference and bibliographical tools for those librarians aspiring to positions in libraries specializing in any one area. [12]

But, in fact, the trend in library and information science education has inevitably been to militate against specialization of all kinds. The generalist's argument is always this: it is impossible to predict where a school's students will eventually be employed, which means that a generalist approach is the fairest approach to meet all possible educational needs. ''Is it possible in any educational program, technical or professional, to prepare for the future? Library educators don't know what kind of position the student will accept, or what kind of an environment or administrative situation he will encounter'' [18]. Educators make the same case today: ''The skills [library schools] teach must be generic . . . it is not advisable to give emphasis in general courses to specific sectors of the information industry'' [22].

At the University of Washington conference in 1967—centered around the education of specialists—the argument of Lester Asheim, ALA's education officer, was typical. Asheim denied that a specialist education was any business of the library school. Admitting medical librarianship to be a specialization but not requiring ''a completely separate program of education,'' Asheim argued that ''certain basic concepts, theories, and techniques are essential for all.'' The use of audiovisual aids, television, and ''adaptation of new

technology to information retrieval . . . are part of the training of all librarians, not just medical librarians'' [23]. What, then, was unique to medical librarianship as a specialty? The subject matter, wrote Asheim, w*as* special to that field; but, for that reason, he argued, that ''*in most cases the course work covering it should be offered outside the school by the masters of the subject*'' [23]. Ironically, faculty members, for Asheim, could not be experts.

The generalist's argument is, then, that because specializations are the proper domain of subject experts, and subject experts are practitioners, and practitioners by definition cannot be full-time faculty members because they are busy practicing, then no full-time faculty member can teach specialist courses, and, therefore, all education located in a library school must necessarily be the education of generalists.

In 1972, ALA's revised standards for accreditation served to support Asheim's position, when the schools' ability to provide generalist training was given more weight than ever before [24]. The Medical Library Association, in its 1991 *Platform for Change,* noted its concern:

While drawing heavily on general librarianship, a librarian in the intellectually and technologically sophisticated context of health care also requires expertise and values significantly different from those of colleagues in some other library services. [25]

But the same platform stated:

Every graduate program in library and information science must lay a broad foundation that stresses theory over application—the foundation on which a practicing librarian can build competent performance in a health sciences environment. [25]

The classic article about the effect of this generalist education on medical library education remains that of Ellen Gay Detlefsen and Thomas Galvin [26]. They described a trend in library science education beginning in the 1970s, when women formerly shut out of male-dominated fields such as medicine—the educated women of their day who might formerly have become medical librarians or nurses—now had more career options. This trend served to shrink the potential pool of future specialists in a female-dominated profession. Further contributing to this trend were a relative famine in federal funding for library education following the feast of the Medical Library Assistance Act; ''the inescapable costs of specialized courses'' that, because of their specialization, have smaller enrollments; and these enrollments in a famine economy tended to drop in response to students' nervousness about overspecialization for specialized jobs that could not be guaranteed to exist. In the end, for all these reasons, a specialized class was an expensive class for a library school to offer.

Detlefsen and Galvin found that forty-one of fifty-four ALA-accredited degree programs offered one or more courses in health sciences or biomedical librari-anship, typically a subject bibliography course backed up by an internship or practicum for the practical side of training [26]. What worried the authors was not the number of courses, but that in forty-one schools, only ten full-time faculty self-identified as having a specialty in medical librarianship. This state meant that thirty or more of the forty-one programs had to be relying on adjuncts to teach, typically those working medical librarians active as full-time practitioners.

This situation placed medical library education at the top of a slippery slope *if adjunct faculty could not be found*: ''a number of library schools [had] dropped specialty courses when they could no longer find students or adjunct faculty with specializations'' [26]. Thus, the odds continued the trend against the hiring of full-time faculty in this specialty. As Detlefsen and Galvin discuss, full-time faculty are distinct from adjuncts, because they are hired to be full-time educators and not practitioners. They thus have a vested interest in, and assume responsibility for, developing and shaping full-time curricula.

EXPERTS AND NONEXPERTS

MEDLINE defines the medical library profession as a profession of expert searchers. Adams, of NLM, wrote early about the impact of MEDLARS: that it was ''not a revolution of automation; it is a renaissance of libraries'' [5]. Some viewed the expertise as subject knowledge: Ralph Esterquest of Harvard, a place with many campus authorities, thought librarians would become superexperts and ''the campus or community authority on biomedical communication'' [27]. But, in fact, the most significant impact of MEDLINE was its creation of the role of the expert: ''The 'searcher' type of person who stands as an intermediary between the research scientist and the computer will require skills at a new level of professional competence'' [5].

The intermediary was born of batch processing. Batches were used in the 1950s to the 1960s, because it was the most economical response to the magnetic tape environment, in which multiple searches were submitted on a schedule to search multiple files sequentially. Batch processing required a small number of dedicated searchers, working in few locations; training was individual and intense but required for few people. When time-shared access to files made direct access more inexpensive, online searching became truly interactive, a real dialogue between searcher and system. The evolving network of regional medical libraries required an ever-increasing number of MEDLINE users as part of their suite of tools and daily activities, but no longer in a dedicated fashion; training could be still be individual but became more distributed and the skills more common.

Medical librarians using an *interactive* system were forced to relocate their professional selves to an *intermediary* role, as Taine expressed it: ''the formidable task of mediating between the sophisticated inquirer and the idiot computer'' [6]. The expert searcher was a bridge between the inquirer—the patron—and the

system. Adams, deputy director of NLM and a former president of the American Documentation Institute, was careful to point out that MEDLARS' origins and location in the library and the library profession gave it unique advantages among automated solutions to information overload. For one thing, the system was built on an indexing technology ''derived from eighty years of bibliographic experience with the literature'' and would continue to be operated in an environment where that bibliographic experience was a constant. ''The power of supplying the textual information from the published literature,'' wrote Adams, ''matches the power of retrieving citations'' [5]. So, even at this early date, medical library professionals, and the government that funded them, explicitly associated classic librarian skills—honed through years of fielding, interpreting, and answering questions—with the optimal performance of a machine designed to do the same thing. In fact, the near-total identification of ''good librarian'' with ''good system'' was for some medical librarians so acute that they later viewed the transition as seamless, because their tools remained the same. Brodman wrote that the creation of MEDLARS had somewhat *less* impact at first on the medical library profession than might have been expected, because one of its most important products ''appeared in traditional printed form and did not require medical libraries to change in order to use it'' (Brodman probably meant *Index Medicus)* [16].

Initially, this mediating function was what separated the expert from the customer. The expert was the ''manipulator . . . the person who sits at the terminal, *translates the search topic into machine language* and interacts with the system'' as distinct from the ''consumer of the information . . . the recipient of the retrieved citations or other information items'' [28, italics added]. In this statement, ''consumers'' clearly did not search. William F. Marovitz implied that there was a good reason: ''Most of the data . . . are most suitably reached through [the] librarian community,'' because the bibliographic systems use ''a rather arcane command structure'' [29]. Harold Schoolman added, ''the user must be very familiar with the structure of the system or he may encounter some difficulty in locating the information desired'' [30]. Or as Carol Tenopir, a noted educator in online searching, put it more recently, ''End users don't need to know what is under the hood, but information professionals do'' [31].

An interesting feature of experts is that we not only characterize *ourselves* by expertise, but characterize *others* as nonexperts by their lack of skills. If medical librarians are experts, their clients are the nonexperts. But, even as early as 1973, some tension over the degree of expertise necessary to search MEDLARS was already apparent, and the definition of ''expert'' began to change accordingly. McCarn and Leiter wrote of the intensive three-week NLM training program: ''Usually such extensive knowledge is not necessary to use the system, but these experts are available to assist users in formulating complicated searches, should they be needed'' [10]. Although the ''expert'' versus ''user''

distinction made here is between expert NLM staff and nonexpert NLM staff, the fact that it is necessary to *make* a distinction between levels of expertise for a two-year-old system is still interesting.

By 1980, the definition of ''expert'' had begun a subtle shift to incorporate experience in searching, as opposed to experience in mediating. An NLM-sponsored study by Judith Wanger examined the effect of training on search performance: ''We may not agree on what constitutes good and bad searching practice, but if . . . experienced searchers don't begin to articulate these differences and back them up with some formal study, we won't know where and why we disagree!'' [32]. Most relevant to the present discussion is Wanger's definition of training: ''formal'' meant training done by NLM; ''informal'' was training done by anyone else: ''by a colleague, through MEDLEARN, through self-instruction, library school, etc.'' [32]. The equating of library school–based instruction with self-instruction is illuminating.

Increasingly, the ''expert'' clearly was the person who had the training. And because NLM had been the earliest and the most consistent provider of such training for medical librarians at all stages of their careers—from internships through continuing education—''training'' itself became synonymous with ''trained by NLM.'' Berk and Davidson's library school instructors, for example, were careful to say they did not see their courses as ''competing with NLM in producing trained searchers'' [21]. But this attitude only served to reinforce the ongoing dilemma of the library schools. As Detlefsen and Galvin demonstrated [26], these schools principally employed medical librarian practitioners, and not full-time faculty, to teach medical courses. These practitioners were of a generation themselves trained through NLM's regional libraries. A vicious cycle was established in which training in medical online searching was best done by the ''experts'' from outside—the ''subject masters'' recommended by Asheim in 1967. But, as adjuncts, they lacked access to the decision-making structures of the schools and, thus, access to change the curriculum and change the situation. This cycle means that library schools are less likely to be able to offer medical information–retrieval courses on a regular basis. The entry of Web searching into a crowded generalist curriculum makes the provision of specialist courses even more problematic.

A SYRACUSE SNAPSHOT

Syracuse University's School of Information Studies can serve as an illustration of the trends in medical library education over time. Detlefsen has identified five ''success factors'' for LIS programs specializing in health information [33]. Because Syracuse University has not owned a health sciences school since 1950, Syracuse's library school presents an interesting counterexample. Only two of Detlefsen's five success factors have ever been present: ''at least one faculty member in the doctoral LIS program with a declared interest

in health information'' and ''a group of associated medical or health sciences facilities and programs nearby.'' Missing from Detlefsen's desiderata are: ''a large academic health sciences library nearby'' (the 70,000-square-foot Upstate Medical University library is nearby, but has not been part of Syracuse University since 1950); ''medical informatics and training at the same university''; and ''links among the four groups.''

Opened in 1908, this school offered its first medical librarianship course in 1949, incorporating scientific bibliography, which was offered yearly until 1973, when both the school and the curriculum underwent drastic revision. In 1970, for the first time, complementing basic subject bibliography, the concept of an ''Advanced Topic'' course appeared as a catchall for courses offered according to instructor availability and student interest. In ''Bibliographic Resources and Systems,'' the content was described as: ''may include . . . medical bibliography'' among numerous other topic choices, including music and African studies [34].

In 1973, all subject bibliography courses disappeared from the curriculum. In 1974, Dean Robert Taylor introduced the School of Information Studies: ''Truly a program for generalists: generalists of the highest order who can relate people to information.'' Taylor proclaimed, ''The change in name is not a cosmetic cover, but a recognition that the activities, interests, and courses we presently have cover a much broader spectrum than librarianship'' [35]. In this environment, specializations had been retrofitted as advanced topics and were offered consistently from 1973 to 1987.

In 1985, ''Biomedical Information Sources and Services'' appeared; its content included: ''Development of computerized data bases. Hands-on searching experience.'' Ever since, this course has been offered every two years, taught by local medical librarian adjuncts and visiting faculty from other LIS programs. Beginning in 2002, when the author joined the full-time faculty, courses in consumer health information resources and information retrieval in medicine have also been available but planned to be offered on a rotating basis every two years.

During the Syracuse school's eighty-six-year history, then, medical librarianship—and the database searching skills requisite to medical librarianship—has typically been taught either by a visiting faculty member or an adjunct practitioner. Only since 2000 have any full-time faculty taken responsibility for this specialty and that as an extra, summer course in addition to their regular course load.

As Detlefsen and Galvin discuss [26], the principal difference between full-time faculty and adjuncts, whether at a research-intensive school with doctoral programs or a master's-centered teaching-oriented school, is that full-time faculty exist to be full-time educators and not practitioners. This means that they are required to maintain a presence on committees that direct curriculum formation for their degree programs and concentrations, as well as those that admit future professionals in their specialties for training. Full-time

faculty thus have a vested interest in building their specialty into that curriculum. Faculty members who are permitted to be dedicated to their specialties are an expression of support on the part of the school that the specialty is important. This expression itself builds larger enrollments, because students in search of schools perceive that the school supports their specialty—witness the dynamic programs at the Universities of Pittsburgh and North Carolina. In contrast, the adjunct professors who make up most of the medical librarianship workforce in schools cannot advocate for change or defend their specialty, not because they do not have expertise in the content of the course, but because they are employed full time elsewhere and are subject to their own employers' needs and responsive to their employers' reward systems. The library school context is thus unfriendly to production of future medical searchers.

THE INFORMATIONIST AND OTHER ROLES

In the new dialogue about another new role for librarians, the old tension between experts and nonexperts has arisen again, as our searching skills once again define us. But the Web has changed the dynamic. Hands-on searching is commonplace; training, where it occurs, is self-assigned; and nonexperts now consider themselves experts. Tenopir has observed of library science students that, because some now are already ''searchers'' when they arrive and ''have searched the Web and library online catalogs for years, many consider themselves experts'' [31] and must wonder what their professors have to teach them.

Frank Davidoff and Valerie Florance [36] argue that the ''informationist'' is needed, because physicians do not have the training in information-retrieval skills that medical librarians have. But physicians do not appear to agree. In one study, only 25% of health care professionals, ''mostly physicians,'' believed that a librarian could find all relevant research articles required to support their evidence-based medical practice. Whether this belief is ''due to the misconceptions of the doctors or due to their previous experience of mediated searching,'' the two options are equally worrying [37]. The role of the medical librarian as expert searcher is in jeopardy. One writer's take-home point from the Johns Hopkins tragedy is that the patient ''might have survived if information from the 1950s . . . about the toxicity of the agent being studied *had been more readily accessible*'' [38, italics added]. From the librarian expert's point of view, of course, the information is perfectly ''accessible''—to librarians with training in information retrieval. Yet the librarian's role must be visible to be understood, and searching is now not only invisible but ubiquitous.

The risks of underestimating librarian expertise evident at Johns Hopkins in 2001 were noted thirty years ago by Sewell's students at Maryland. Asked ''Do you think the scientist should be encouraged to use the [MEDLARS] system by himself? Why or why not?,'' six of Sewell's fifteen students responded negatively.

With eerie prescience, one clarified: ''The scientist would achieve incomplete retrieval and be unaware of it primarily because it would not be worth his time to *bother* to learn all the finer points to do a thorough search'' [20].

It is as clear now as it was in 1974: the three interdependent subsystems of our professional machine—our schools, our association, and our professional peers—must all respond to this challenge by asserting our expertise in our curricula, in our continuing education, and in our dialogues with each other. Only by acknowledging the interaction of these subsystems will real and positive changes be effected to benefit our profession and our constituencies.

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